

REMARKS

The Applicants sincerely appreciate the thorough examination of the present application as evidenced by the Office Action of June 3, 2005. In response, the Applicants have canceled Claims 1, 5, 20, 24, and 28-58; rewritten Claims 2, 6, and 25 in independent form and to further define the claimed invention; amended Claims 3-4 and 7-11, 13, 15-16, and 18-19 to depend from Claim 6; amended Claims 21-23, and 26 to depend from Claim 25; and added new Claims 59-75. In the following remarks, the Applicants will show that all claims are patentable over the cited art. All pending claims are, thus, patentable over the cited art, and a Notice of Allowance is respectfully requested in due course. Moreover, the Applicants note that claims have been canceled to advance prosecution of the present application without prejudice to the Applicants' right to pursue canceled claims in a continuing application.

Consideration Of Applicants' Information Disclosure Statements Is Appreciated

The Applicants appreciate the Examiner's consideration of the patents cited in the Information Disclosure Statements of January 12, 2005, and February 10, 2004. With respect to the Korean Office Action cited in the Information Disclosure Statement of January 13, 2005, consideration thereof is not required because the Korean Office Action does not constitute prior art. The Korean Office Action was submitted to show that U.S. Patent No. 6,150,238 was cited in a communication from a foreign patent office in a counterpart application not more than three months prior to filing the Information Disclosure Statement.

All Objections To The Claims Have Been Addressed

The Office Action has objected to Claim 20 stating that there is insufficient antecedent basis for the recitation "the exposed portion of the raised pattern". The Applicants have canceled Claim 20 and amended Claim 25 to include all recitations of Claim 20. Moreover, Claim 25 has been amended to recite "on exposed portions of the raised pattern...." All objections with respect to Claim 20 have thus been overcome.

The Office Action has also objected to Claims 28 and 43 which have been canceled to advance prosecution of the present application. Accordingly, all objections with respect to Claims 28 and 43 have been overcome.

All Rejections Under 35 U.S.C. Sec. 112 Have Been Addressed

Claims 41-45 and 58 have been rejected under 35 U.S.C. Sec. 112 being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 41-45 and 58, however, have been canceled to advance prosecution of the present application. Accordingly, all rejections under 35 U.S.C. Sec. 112 have been overcome.

Claim 2 Is Patentable Over Sato

Claim 2 has been rejected under 35 U.S.C. Sec. 102(e) as being anticipated by U.S. Patent No. 6,798,038 to Sato *et al.* ("Sato"). The Applicants respectfully submit, however, that Claim 2 is patentable over Sato for at least the reasons discussed below.

Claim 2 has been rewritten in independent form (to include all recitations of Claim 1) and to more clearly define the claimed invention. As amended, Claim 2 recites a method of forming an electronic device including a substrate and a raised pattern on the substrate wherein the raised pattern has a surface opposite the substrate, the method comprising:

forming a first insulating layer on the raised pattern and on the substrate wherein forming the first insulating layer comprises forming a first portion of the first insulating layer on the surface of the raised pattern opposite the substrate and on the substrate using a first processing condition and forming a second portion of the first insulating layer on the surface of the raised pattern opposite the substrate and on the substrate using a second processing condition so that the first portion is between the second portion and the surface of the raised pattern opposite the substrate;

after forming the first insulating layer including the first and second portions, removing portions of the first insulating layer to expose portions of the raised pattern while maintaining portions of the first insulating layer on the substrate; and

after removing portions of the first insulating layer, forming a second insulating layer on the exposed portions of the raised pattern and on the maintained portions of the first insulating layer;

wherein the substrate comprises a semiconductor substrate, wherein the raised pattern comprises a trench isolation pattern in the semiconductor substrate, and wherein

maintaining portions of the first insulating layer on the substrate comprises maintaining portions of the first insulating layer in trenches defined by the trench isolation pattern.

In particular, Sato fails to teach or suggest forming a first portion of the first insulating layer on the surface of the raised pattern opposite the substrate and on the substrate using a first processing condition and forming a second portion of the first insulating layer on the surface of the raised pattern opposite the substrate and on the substrate using a second processing condition so that the first portion is between the second portion and the surface of the raised pattern opposite the substrate. In support of the rejection, the Office Action states that:

Sato discloses a ... forming a first portion (12 in Fig. 4A-4H or 6/7 in Fig. 9A-9P) of the first insulating layer using a first processing condition and forming a second portion (6/7 in Fig. 4A-4H or 26-27 in Fig. 9A-9P) of the first insulating layer using a second processing condition....

Office Action, page 8.

With respect to the structures/steps of Figures 4A-4H of Sato, the Office Action interprets the oxide film 12 as a first portion of a first insulating layer and the Office Action interprets the high density plasma (HDP) film 6/7 as a second portion of the first insulating layer. The oxide film 12, however, is not between the HDP film 6/7 and a surface of the raised pattern opposite the substrate.

With respect to the structures/steps of Figures 9A-9P of Sato, the Office Action interprets the HDP film 6/7 as a first portion of a first insulating layer and the Office Action interprets the HDP film 26/27 as a second portion of the first insulating layer. The HDP film 6/7, however, is not between the HDP film 26/27 and a surface of the raised pattern opposite the substrate. Moreover, nothing in Sato teaches or suggests that the HDP film 6/7 and the HDP film 26/27 are formed using different processing conditions.

Accordingly, the Applicants respectfully submit that Sato fails to teach or suggest the recitations of Claim 2, and that Claim 2 is thus patentable. In addition, dependent Claims 59-75 are patentable at least as per the patentability of Claim 2 from which they depend.

Moreover, Claim 59 is separately patentable over Sato. Claim 59 recites that the first insulating layer includes closed voids therein and that removing portions of the first insulating layer comprises opening the voids in the first insulating layer. Sato teaches away from closed

voids in a first insulating layer because Sato discusses methods/steps where "a remaining opening is 10nm." (See Sato, col. 12, line 28. See also, Sato, col. 12, lines 57-58, and Figures 4B, 9G, and 9L.) Accordingly, Claim 59 is separately patentable over Sato.

Claims 6 and 25 Are Patentable Over Chung

Claims 6 and 25 have been rejected under 35 U.S.C. Sec. 102(b) as being anticipated by U.S. Patent No. 6,204,161 to Chung *et al.* ("Chung"). The Applicants respectfully submit, however, that Claims 6 and 25 are patentable over Chung for at least the reasons discussed below.

Claim 6, for example, has been rewritten in independent form (to include all recitations of Claim 1). As amended, Claim 6 recites a method of forming an electronic device including a substrate and a raised pattern on the substrate, the method comprising:

- forming a first insulating layer on the raised pattern and on the substrate wherein forming the first insulating layer comprises forming a first portion of the first insulating layer using a first processing condition and forming a second portion of the first insulating layer using a second processing condition;

- after forming the first insulating layer including the first and second portions, removing portions of the first insulating layer to expose portions of the raised pattern while maintaining portions of the first insulating layer on the substrate; and

- after removing portions of the first insulating layer, forming a second insulating layer on the exposed portions of the raised pattern and on the maintained portions of the first insulating layer;

- wherein the first insulating layer includes closed voids therein, and wherein removing portions of the first insulating layer comprises opening the voids in the first insulating layer, and wherein openings in the voids are substantially at least as wide as any portions of the opened voids between the openings and the substrate.

In particular, Chung fails to teach or suggest openings in voids that are substantially at least as wide as any portions of the opened voids between the openings and the substrate. In support of the rejection, the Office Action states that:

- Chung discloses that the openings in the voids are substantially at least as wide as portions of the opened voids between the openings and the substrate.

Office Action, page 4. No citation to Chung, however, is provided. In particular, Chung states that:

This etch-back is performed so that any voids 320 in the first interlayer insulating film therein are exposed and preferably reduces the first interlayer insulating film 300 to a thickness of about 1500 Δ to 2000 Δ . (Underline added.)

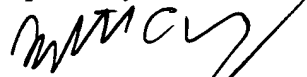
Chung, col. 8, lines 1-4. The Applicants respectfully submit, however, that Chung fails to teach or suggest openings in voids that are at least as wide as any portions of the opened voids between the openings and the substrate.

Accordingly, the Applicants respectfully submit that Chung fails to teach or suggest the recitations of Claim 6, and that Claim 6 is thus patentable. The Applicants further submit that Claim 25 is patentable for reasons similar to those discussed above with regard to Claim 6. In addition, Dependent Claims 2-4, 7-19, 21-23, and 26-27 are patentable at least as per the patentability of Claims 6 and 25 from which they depend.

CONCLUSION

Accordingly, the Applicants submit that all pending claims in the present application are in condition for allowance, and a Notice of Allowance is respectfully requested in due course. The Examiner is encouraged to contact the undersigned attorney by telephone should any additional issues need to be addressed.

Respectfully submitted,



Scott C. Hatfield
Registration No. 38,176

Customer Number 20792

Myers Bigel Sibley & Sajovec, P.A.

P.O. Box 37428

Raleigh, NC 27627

919-854-1400

919-854-1401 (Fax)

CERTIFICATE OF FACSIMILE TRANSMISSION

Date of Deposit: August 30, 2005

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office to (703) 872-9306 on the date indicated above and is addressed to: MAIL STOP AMENDMENT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Joyce Paoli

